

YEAR 7 — APPLICATION OF NUMBER

Solving problems with multiplication and division

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What do I need to be able to do?

By the end of this unit you should be able to:

- Understand and use factors
- Understand and use multiples
- Multiply/ Divide integers and decimals by powers of 10
- Use formal methods to multiply
- Use formal methods to divide
- Understand and use order of operations
- Solve area problems
- Solve problems using the mean

Keywords

Array: an arrangement of items to represent concepts in rows or columns
Multiples: found by multiplying any number by positive integers
Factor: integers that multiply together to get another number.
Mil: prefix meaning one thousandth
Centi: prefix meaning one hundredth
Kilo: prefix meaning multiply by 1000
Quotient: the result of a division
Dividend: the number being divided
Divisor: the number we divide by

Factors

Arrays can help represent factors

Factors of 10
 5×2 or 2×5
 1, 2, 5, 10

10×1 or 1×10

The number itself is always a factor

Square numbers have an ODD number of factors

Factors of 4
1, 2, 4

Factors of 36
1, 2, 3, 4, 6, 9, 12, 18, 36

Be strategic - Lay factors out in pairs can help you not to miss any

Multiples

Bar models can represent by something is a multiple. Eg 20 is a multiple of 4

Lowest Common Multiples

LCM of 9 and 12
 9: 9, 18, 27, 36, 45, 54
 12: 12, 24, 36, 48, 60
 LCM = 36

The first time their multiples match

Multiply/ Divide by powers of 10

$3 \times 100 = 300$

$0.03 \times 100 = 3$

Repeated multiplication and division by powers of 10 is commutative
 $\div 10$ then $\div 10 \rightarrow \div 100$

Metric conversions

Useful Conversions

mm $\xrightarrow{\times 10}$ cm $\xrightarrow{\times 100}$ m $\xrightarrow{\times 1000}$ km
 km $\xrightarrow{\div 1000}$ m $\xrightarrow{\div 100}$ cm $\xrightarrow{\div 10}$ mm

g $\xrightarrow{\times 1000}$ kg $\xrightarrow{\div 1000}$ g

ml $\xrightarrow{\times 1000}$ L $\xrightarrow{\div 1000}$ ml

Division methods

Short division
 $3584 \div 7 = 512$

Complex division
 $\div 24 = \div 6 \div 4$
 Break up the divisor using factors

Division with decimals
 The placeholder in division methods is essential - the decimal lines up on the dividend and the quotient

$24 \div 0.02 \rightarrow 24 \div 0.2 \rightarrow 240 \div 2$

All give the same solution as represent the same proportion
 Multiply the values in proportion until the divisor becomes an integer

Multiplication methods

Less effective method especially for bigger multiplication

Long multiplication (column)

Grid method

Repeated addition

Multiplication with decimals
 Perform multiplications as integers
 e.g. $0.2 \times 0.3 \rightarrow 2 \times 3$

Make adjustments to your answer to match the question: $0.2 \times 10 = 2$
 $0.3 \times 10 = 3$
 Therefore $6 \div 100 = 0.06$

Order of operations

Brackets
 Indices or roots
 Multiplication or division
 Addition or subtraction

If you have multiple operations from the same tier work from left to right

e.g. $10 - 3 + 5 \rightarrow 10 - 3 \rightarrow 7 + 5$

e.g. $6 \times 4 + 8 \times 2 = 24 + 16 = 40$

Area problems

Rectangle
 Base x Perpendicular height

Parallelogram/ Rhombus
 Base x Perpendicular height

Triangle
 $\frac{1}{2} \times$ Base x Perpendicular height

A triangle is half the size of the rectangle it would fit in

Mean problems

Mean - a measure of average. It gives an idea of the central value

Lilly, Annie and Ezra have the following cubes

Lilly: 8 cubes
 Annie: 8 cubes
 Ezra: 8 cubes

24 in total

Finding the mean amount is the average amount each person would have if shared out equally

The mean number of blocks would be 8 each